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Prolific physicist selected for Air Force Research Laboratory honor

Veteran scientist recognized for breakthrough satellite drag studies and for other key contributions to national defense

An article and photograph, published in *The Boston Globe* during the 1950s, about groundbreaking work on satellites occurring at Hanscom Air Force Base, Mass., inspired Frank Marcos to a lifetime of public service at that same installation.

In September, the 46-year career Dept. of Defense physicist, serving with the Air Force Research Laboratory's Space Vehicles Directorate, will be recognized with other esteemed scientists and engineers as an AFRL Fellow at a banquet to be conducted at Wright-Patterson AFB, Ohio.

"I have been here at Hanscom Air Force Base for the past 46 years just trying to do my job, and being selected as an AFRL Fellow is an incredible, as well as an unexpected honor," said Marcos. "It is really fantastic to get this recognition, but it is a testimony to the great people I have had the privilege to serve with during all these years."

Beginning his federal government employment in missile detection, the native son eventually transferred his talents and focus to the Air Force's burgeoning spacecraft program. From 1968 to 1984, he led 13 satellite flight programs featuring accelerometer experiments measuring low-altitude (below 120 miles altitude) density. In addition, he directed the projects' instrument development, calibration, integration, field evaluation, orbital operations, data reduction and scientific analysis. Since then, Marcos has become an internationally-known authority on satellite drag, which, due to its unpredictability, can hinder spacecraft performance 360 miles or less above the earth's surface. His exhaustive research on this topic has significantly enhanced the Air Force's capability to forecast the trajectories and reentry paths of both friend and foe space objects, to prevent collisions of manned vehicles flying in the cosmos such as the International Space Station, and to boost laser communication dependability.

"In my career, I have worked on satellite programs and model developments, and lots of people work in these areas. It is most satisfying, however, when you are able to directly solve problems," said the new AFRL Fellow. "Our Space Weather Center of Excellence team is providing state of the art capabilities directly to the Air Force."

On the other hand, recognition for his scientific work in space weather has not been foreign. Six years ago, he received the Harold Brown Award, the Air Force's most prestigious honor for science and technology, for his innovative approach in circumventing satellite drag errors caused by unpredictable atmospheric density variations. Marcos' pioneering prototype became the foundation for the Air Force Space Command's High Accuracy Satellite Drag Model, which has transformed orbit forecasting, and has reduced measured errors below the operationally acceptable level of five percent. In addition, in April, Marcos received the 2005 Guenter Loeser Memorial Award, which is presented annually to a member of the Space Vehicles Directorate's Battlespace Environment Division at Hanscom AFB for outstanding research contributions.

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His breakthrough research has also been communicated to technical and operational audiences. He has had 30 plus papers (several of which he served as the primary author) published in the open literature (and at least 24 of these appeared in refereed journals), as well as accomplished 20 technical reports and one book chapter. In addition, the prolific physicist has written or co-written over 100 presentations conducted at national and international meetings. He has also held the position of chairman, American Institute of Aeronautics and Astronautics' Atmospheric Environment Committee on Standards, and currently participates on the organization's Atmospheric Environment Technical Committee. Finally, Marcos served on numerous Air Force and NASA committees dealing with subjects such as space debris, Hubble telescope orbital environment, space environment effects and tethered satellites, as well as is currently a member of the National Aeronautics and Space Administration's Living With a Star Focused Science Team on Thermospheric Density and Composition.

The AFRL Fellows program honors the top scientists and engineers within its ten directorates for outstanding contributions to technology. To be considered for the distinctive achievement, eligible military members and civilian employees must have worked within AFRL for the past three consecutive years and have accomplished at least seven years of federal service.

"Studying the effects of satellite drag has been exciting and rewarding work. It has been useful because the information has directly contributed to the Air Force meeting its mission requirements," said Marcos. "The program is receiving data that no one else has, and the Air Force values our research."



AFRL Fellow Frank Marcos